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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/914,687	12/11/2001	Markus Bohm	20496-301	1000
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KLAUS J. BACH 4407 TWIN OAKS DRIVE MURRYSVILLE, PA 15668			VILLECCO, JOHN M	
			ART UNIT	PAPER NUMBER
			2612	

DATE MAILED: 03/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/914,687	Applicant(s) BOHM ET AL.	
	Examiner John M. Villecco	Art Unit 2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
- 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
- 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/11/01</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the non-volatile storage from claim 14, the digital store which is assigned an A/D converter in claim 15, the multi-level digital approach in which numerous digital bits are represented in an amplitude-discretized analog signal in claim 16, the storage which is assigned a reciprocal A/D converter in claim 17, the vertical storages from claim 19, the SRAM cell from claim 20, and the storage that is designed to be magnetic, optical, organic, or biologic from claim 21 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

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be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. **Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading.** If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or
REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)
- (e) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (f) BRIEF SUMMARY OF THE INVENTION.
- (g) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (h) DETAILED DESCRIPTION OF THE INVENTION.
- (i) CLAIM OR CLAIMS (commencing on a separate sheet).
- (j) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (k) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

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3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- In claim 8, applicant discloses a light sensitive MOS capacitor, especially a MOS varactor. However, a discussion of a MOS varactor cannot be found in the specification.
- In claim 11, applicant discloses a MOS capacitor as the storage element. However a discussion of the storage element being a MOS capacitor cannot be found in the specification.
- In claim 12, applicant discloses that the capacitor is a plate capacitor whose plate consists of polysilicon. However a discussion of the capacitor being a plate capacitor whose plate consists of polysilicon cannot be found in the specification.

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 7, 14-17, and 19-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

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described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

7. Regarding *claim 7*, applicant has made reference to a PCT publication (PCT/EP/97/05978) in order to describe the structure of the multispectral diode as claimed in claim 7. This appears to be an attempt at an incorporation by reference to the subject matter of PCT/EP/97/05978. Since this subject matter is considered to be “essential” subject matter, incorporation by reference is only limited to (1) a US patent (2) a US patent application publication or (3) a pending US application. Furthermore, mere reference to another application, patent, or publication is not an incorporation of anything therein into the application containing such reference for the purpose of the disclosure required by 35 U.S.C. 112, first paragraph. See MPEP § 608.1(p). Therefore, for the above mentioned reasons, the subject matter of claim 7 has not been described in a manner in which one of ordinary skill in the art would have been able to make and use the invention. For examination purposes it will be assumed that this limitation can be found in the specification.

8. Regarding *claim 14*, applicant claims that the storage element is a non-volatile storage. However, the only mention of the storage element being a non-volatile storage element is found on page 5, lines 22-28 of the applicant’s specification. There is no disclosure of how one would go about implementing a non-volatile storage element into the semiconductive carrier of Figure 1, 2, and 3. Claim 1 is clearly directed toward Figure 1 since the claim includes the reference numbers shown in Figures 1. Furthermore, one of ordinary skill in art would not be enabled by the discussion of the non-volatile storage elements on page 5, to make and use the claimed invention without undue experimentation.

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9. As for *claim 15*, applicant claims that the storage is a digital storage that is assigned an A/D converter. However, the only mention of the storage element being a digital storage assigned an A/D converter is found on page 4, lines 26-33 and page 5, lines 22-28 of the applicant's specification. There is no disclosure of how one would go about implementing a digital storage element into the semiconductive carrier of Figures 1, 2, and 3. Claim 1 (from which claim 15 depends) is clearly directed toward Figure 1 since the claim includes the reference numbers shown in Figures 1. Furthermore, one of ordinary skill in art would not be enabled by the discussion of the digital storage elements on pages 4 and 5, to make and use the claimed invention without undue experimentation.

10. With regard to *claim 16*, applicant claims that the storage is operated using a multi-level digital approach in which numerous digital bits are represented in an amplitude-discretized analog signal. However, the only mention of the storage element being operated using a multi-level digital approach in which numerous digital bits are represented in an amplitude-discretized analog signal is found on page 4, lines 26-33 of the applicant's specification. There is no disclosure of how one would go about implementing this feature into the semiconductive carrier of Figures 1, 2, and 3. Claim 1 (from which claim 16 depends) is clearly directed toward Figure 1 since the claim includes the reference numbers shown in Figure 1. Furthermore, one of ordinary skill in art would not be enabled by the discussion on page 4, to make and use the claimed invention without undue experimentation.

11. With regard to *claim 17*, applicant claims that the storage is assigned a reciprocal A/D converter that measures the time that the illumination-proportional photostream requires to recharge a capacitor a specific voltage difference. However, the only mention that the storage is

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assigned a reciprocal A/D converter that measures the time that the illumination-proportional photostream requires to recharge a capacitor a specific voltage difference is found on page 5, lines 1-7 of the applicant's specification, which is considered to be in the Summary of the Invention section. There is no disclosure of how one would go about implementing this feature into the semiconductive carrier of Figures 1, 2, and 3. Claim 1 (from which claim 16 depends) is clearly directed toward Figure 1 since the claim includes the reference numbers shown in Figure 1. Furthermore, one of ordinary skill in art would not be enabled by the discussion on page 5, to make and use the claimed invention without undue experimentation.

12. As for *claim 19*, applicant claims that at least two storage elements are vertically integrated. However, the only mention that at least two storage elements are vertically integrated is found on page 5, lines 9-14 of the applicant's specification, which is considered to be in the Summary of the Invention section. There is no disclosure of how one would go about implementing this feature into the semiconductive carrier of Figure 1. Claim 1 (from which claim 19 depends) is clearly directed toward Figure 1 since the claim includes the reference numbers shown in Figure 1. Furthermore, one of ordinary skill in art would not be enabled by the discussion on page 5, to make and use the claimed invention without undue experimentation.

13. Regarding *claims 20 and 21*, applicant claims that the storage element is an SRAM, magnetic, optical, biological, or organic cell. However, the only mention that the storage element is an SRAM, magnetic, optical, biological, or organic cell is found on page 5, lines 22-28 of the applicant's specification, which is considered to be in the Summary of the Invention section. There is no disclosure of how one would go about implementing this feature into the semiconductive carrier of Figures 1, 2, and 3. Claim 1 (from which claim 19 depends) is clearly

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directed toward Figure 1 since the claim includes the reference numbers shown in Figure 1.

Furthermore, one of ordinary skill in art would not be enabled by the discussion on page 5, to make and use the claimed invention without undue experimentation.

14. Claims 14-17, 20 and 21, will not be examined for prior art since it is not clear from the specification what is being claimed or how the invention is to be made and used.

15. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

16. Claims 1-23 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

17. Regarding claims 1, 4, and 8, the phrase "especially" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d). For examination purposes it will be assumed that the applicant is claiming that the invention could be but does not have to be a CMOS device, made of crystalline or amorphous silicon, or a MOS varactor, for claims 1, 4, and 8, respectively.

18. Claims 2, 3, 5-7, and 9-23 are rejected based upon their dependency to claim 1.

Claim Rejections - 35 USC § 102

19. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for

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patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

20. Claims 1-4, 6, 7, 9-10, 15, 18, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Bohm et al. (U.S. Patent No. 6,518,558).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

21. Regarding *claim 1*, Bohm discloses a color image sensor capable of capturing three color images and storing the images using a memory. More specifically, Bohm discloses an image sensor which is inherently disposed on a semiconductor carrier on which an arrangement of pixels is placed. Each pixel includes a photosensor (01), and a grouping of storage means to store electrical signals from the photosensor. Furthermore, each pixel receives a signal, which would inherently be sent from a storage control device in order to read out electrical charge into the storage elements. Each pixel includes three storage means (08, 12, and 16) for storing red, green, and blue images. For each color, the photosensor is first exposed and then stored into the storage means. When each of the colors has been read into the storage means, they are then read out via the read signals (18, 19, and 20). See column 7, lines 37-45 and column 3, lines 10-22. Additionally, Bohm discloses in col. 3, line 43 to column 4, line 60 that the image sensor includes semiconductor carrier.

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22. As for **claim 2**, Bohm discloses a line sensor (col. 6, lines 33-35).

23. With regard **claim 3**, Bohm discloses a two-dimensional pixel matrix (col. 6, lines 33-35).

24. Regarding **claim 4**, Bohm discloses that the image sensor is made of amorphous silicon. Although a photodiode is not specifically disclosed, the detector (01) is interpreted to be the photodiode.

25. As for **claim 6**, Bohm discloses the use of a color filter. See column 5, line 35 and column 8, lines 23-25.

26. With regard to **claim 7**, Bohm discloses that the color image sensor has a p-conducting a-Si:H layer, an intrinsic a-Si:H layer consisting of a first partial layer with more μ -tau product, a second partial layer with less μ -tau product, and a third partial layer with less μ -tau product than the first and second partial layers, and an n-type a-Si:H layer. See column 4, lines 7-18.

27. Regarding **claim 9**, Bohm discloses capacitors (08, 12, and 16) for storing the image signal. The capacitors are interpreted to be the analog storage.

28. As for **claim 10**, as mentioned above in the discussion of claim 9, Bohm discloses the use of capacitors to store the image signal.

29. With regard to **claim 15**, as shown in Figure 4, Bohm discloses a digital memory cell (31) for storing a digital representation of the image signal. The memory cell is assigned an A/D converter (30).

30. Regarding **claim 18 and 19**, Bohm discloses that the storages can be located laterally or vertically adjacent. See column 5, line 13.

Claim Rejections - 35 USC § 103

31. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

32. **Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohm et al. (U.S. Patent No. 6,518,558) in view of Bowers et al. (U.S. Patent No. 6,465,803).**

33. Regarding claim 5, as mentioned above in the discussion of claim 1, Bohm discloses all of the limitations of the parent claim. However, Bohm fails to specifically disclose that the detector is made of an III-V alloy or an II-IV alloy. Bowers, on the other hand, discloses that it is well known in the art to make a photodetector out of an III-V alloy. These alloys provide highly efficient photodetectors which are responsive to different regions of the optical spectrum. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the photodetector out of an III-V alloy so that a highly efficient photodetector is used.

34. **Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohm et al. (U.S. Patent No. 6,518,558) in view of Yamada (U.S. Patent No. 4,373,167).**

35. Regarding *claim 8*, as mentioned above in the discussion of claim 1, Bohm discloses all of the limitations of the parent claim. However, Bohm fails to specifically disclose that detector is a light sensitive MOS capacitor which could be but does not have to be a MOS varactor. Yamada, on the other hand, discloses that it is well known in the art to use a MOS varactor as an

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image sensor. See column 5, lines 18-28. These detectors are well known in the art for the ability to produce a quality image. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the photodiode of Bohm with a MOS varactor since they are so well known in the art for producing a useable image.

36. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohm et al. (U.S. Patent No. 6,518,558) in view of Merrill et al. (U.S. Patent No. 6,369,853).

37. Regarding *claim 11*, as mentioned above in the discussion of claim 1, Bohm discloses all of the limitations of the parent claim. Although Bohm discloses the use of MOS technology in his invention, Bohm fails to specifically disclose that the storage is a MOS capacitor. Merrill, on the other hand, discloses that it is well known in the art to use MOS capacitors to store signal charge. See Figure 3A and column 3, lines 62-66. Since MOS capacitors are so common and well known in the art, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a MOS capacitor to store the signal charge, so that common parts may be used in the building of the image sensor.

38. As for *claim 12*, Merrill discloses that the capacitor is a plate capacitor whose plate consists of polysilicon. See column 9, lines 61-66.

39. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohm et al. (U.S. Patent No. 6,518,558) in view of Merrill et al. (U.S. Patent No. 6,369,853) and further in view of Perner (U.S. Patent No. 6,552,745).

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40. Regarding *claim 13*, as mentioned above in the discussion of claim 11, both Bohm and Merrill disclose all of the limitations of the parent claim. However, neither of the aforementioned references specifically discloses that the capacitor is a DRAM capacitor. Perner, on the other hand, discloses that it is well known in the art that DRAM cells commonly include capacitors to store signal charge. More specifically, as shown in Figure 2, a DRAM cell (32) includes a storage capacitor (42) to store the signal charge. See column 4, lines 56-62. This type of arrangement is well known to be cheap and small. Therefore, it would have been obvious to one of ordinary skill in the art to use a DRAM memory in the sensor of Bohm.

41. **Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bohm et al. (U.S. Patent No. 6,518,558) in view of Shaw et al. (U.S. Patent No. 6,606,122).**

42. Regarding *claim 22*, as mentioned above in the discussion of claim 1, Bohm discloses all of the limitations of the parent claim. However, Bohm fails to specifically disclose that the storage control is located on the surface of the substrate. Shaw, on the other hand, discloses that it is well known in the art to dispose control circuitry on the same substrate as pixel array. As shown in Figure 7 the timing and control circuitry is located on the same substrate. See column 4, lines 30-34. Since the timing and control circuitry is responsible for reading out the pixel charges, this circuitry is interpreted to be the storage control. This feature allows for all of the components of the imager to locate on one substrate thus making the package smaller and easier to integrate. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to dispose the storage control on the surface of the substrate so that all of

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the components are located on one substrate, thus making the package smaller and easier to integrate.

Allowable Subject Matter

43. Claim 23 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and written to overcome the 112 rejection previously presented.

44. The following is a statement of reasons for the indication of allowable subject matter:

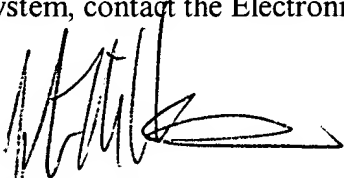
Regarding *claim 23*, the primary reason for indication of allowable subject matter is that the prior art fails to teach or reasonably suggest that the electrical storage is in a layer between the carrier and the detector, and the connection between the storage and the storage control is provided by via holes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John M. Villecco whose telephone number is (703) 305-1460. The examiner can normally be reached on Monday-Thursday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy Garber can be reached on (703) 305-4929. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John M. Villecco
March 2, 2005



WENDY R. GARBER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600